LEGAL IMPLICATIONS OF COLLISIONS IN SPACE

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Thank you and good morning. It is a pleasure to stand before you today to discuss the legal implications of collisions in space. My views on this issue derive from my experience as an attorney in the Office of the Legal Adviser of the Department of State. In recent years I have been involved with the Legal Subcommittee of the UN Committee on the Peaceful Uses of Outer Space, referred to as COPUOS. The Legal Subcommittee is a standing subcommittee of COPUOS and it was the forum for negotiation of the core treaties on outer space.

Liability for damage resulting from space activities has been a topic of international concern since human exploration of space began. Luckily, to date the concern has been primarily theoretical as there has only been one reported serious collision in space and few accidents causing damage on the Earth's surface. The one significant collision in space was the 1996 collision of a *Cerise* satellite with a chunk of an exploded Ariane upper stage launch vehicle. In that instance both space objects were of French origin, so the question of assigning liability never arose. As commercial activities in space increase, however, and more States become active in space, the likelihood of collisions and of collisions involving several States and their nationals increases as well. So regardless of the track record, we are well advised to consider

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carefully the possible legal consequences of spacecraft collisions. Perhaps these considerations will highlight for you the importance of your work in enhancing the safety of satellite operations.

I have been asked to address two potential types of collisions – a collision between two satellites and a collision between a satellite and space debris. "Space debris" and "orbital debris" are from the viewpoint of international law, popular rather than legal terms and as such, have no precise definition. Generally these terms are understood to indicate components or fragments of manmade space objects that are spent or no longer functional. They usually refer only to tangible, physical objects that are manmade and not, for example, to meteoroids. Some national systems do make a distinction between the terms "space debris" and "orbital debris", but I will use them interchangeably throughout this presentation. International legal sources that are potentially relevant to space debris do not use the term "space debris". Rather they refer to "space objects," defined to include "component parts of a space object." Assuming that space debris is considered a "component part of a space object", a collision between two functioning spacecraft and a collision between a functioning spacecraft and space debris would be subject to a similar analysis under international law. In both cases the issue would be liability for damage caused by a space object. The most significant difference between the two types of collisions is that it is generally easier to identify a functioning spacecraft than a small piece of space debris. As you are well aware, the vast majority of debris in space is not tracked, and even tracked debris may be of unknown origin.

Let us begin with an overview of the international legal framework that governs liability for collisions in space. We will consider this framework as it applies both to a collision between two functioning spacecraft and to collisions between a functioning spacecraft and orbital debris. We will then turn our attention to domestic law that is relevant to the special problem of potential collisions between spacecraft and orbital debris.

"International law" is a phrase that is frequently used loosely. A rule of international law is one that has been accepted as such by the international community of states in the form of customary law, by derivation from general principles common to the major legal systems of the world or by international agreement. With respect to the international law of Outer Space, we are – with certain exceptions – talking about a body of treaty law, formally adhered to by the vast majority of relevant States, including, with respect to the core space treaties, the United States. With respect to legal consequences of collisions in space, the key international instruments are the "Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies", referred to as the "Outer Space Treaty", and the "Convention on International Liability for Damage Caused by Space Objects", referred to as the "Liability Convention". The Outer Space Treaty entered into force on October 10, 1967 and the Liability Convention on September 1, 1972. The Outer Space Treaty contains several provisions relating to liability for space activities and the Liability Convention elaborates on those provisions, setting out a more detailed liability regime. I will address some key provisions of these two treaties in turn.

The Outer Space Treaty provides that parties bear international responsibility for national activities in outer space, and that non-governmental activities require authorization and continuing supervision. (Article VI) This provision makes clear that a Party must have some kind of approval/monitoring process for private space activities and that, although the scope of "national activities" is unclear, a Party could be responsible for at least some of its nationals' activities in space. Further, the Outer Space Treaty specifies that each State party that launches or procures the launching of an object into outer space, as well as each State Party from whose territory or facility an object is launched, is internationally liable for damage to another party or to its natural or juridical persons by such object or its component parts on the Earth, in air space or in outer space. (Art VII) This principle is further elaborated in the Liability Convention. It is important to note that the Outer Space Treaty does not contain any provision for resolving disputes that may arise under it; thus, there is no mechanism for bringing claims against other parties.

The Liability Convention sets forth a significantly more detailed scheme for liability for damage caused by space objects and as such is highly relevant to collisions in space and to the issue of orbital debris. Liability under this convention is based upon a party's status as a "launching State" of a space object. A "launching State" is a State that launches or procures the launching of the space object or a State from whose territory or facility the space object is launched. There can be multiple launching States for a single space object. A "space object" under the Liability Convention is defined to include "component parts of a space object as well as its launch vehicle and parts thereof"; there is no requirement that such parts be functional.

Under the Liability Convention, potential damage caused by space objects falls into two categories: damage caused by space objects on the surface of the Earth or to aircraft in flight, on the one hand; and damage caused by space objects not on the surface of the Earth (i.e., thus in space) to other space objects or to persons or property on board other space objects. For damage caused by a space object on the surface of the Earth or to aircraft in flight, a launching State is absolutely liable regardless of fault. Where there are multiple launching States for a space object that causes damage on the surface of the Earth or to aircraft in flight, those launching States have absolute joint and several liability. With respect to collisions in space, it seems likely that damage would in most cases be to other space objects and to persons or property on board such space objects, and not damage on the surface of the Earth. The Liability Convention provides that for damage in space caused by a space object of one launching State to another launching State's space object or to persons or property on board such a space object, a launching State is only liable if the damage is due to its fault or the fault of persons for whom it is responsible.

The Liability Convention also covers the situation where a space object of one launching State causes damage to a space object of another launching State, the consequence of which is to cause damage to a third State or to its natural or juridical persons. If the damage to the third State is caused in space – by damaging the third State's space object or persons or property on board - the first two launching States are jointly and severally liable based on their fault. Thus, a third State whose space object or natural or juridical persons were damaged could seek recovery against either of the two launching States whose space objects caused damage to the third State's object.

Apportionment of damages between the first two States will be done based on their relative fault. If the damage to the third State is caused on Earth's surface or to aircraft in flight, which seems a fairly unlikely result from a collision in space, the first two launching States have absolute joint and several liability to the third State.

In contrast to the Outer Space Treaty, the Liability Convention contains a dispute settlement mechanism that could be invoked by a claimant State. If diplomatic negotiations do not result in the settlement of a claim, either party concerned can request the establishment of a Claims Commission. The Claims Commission will decide the merits of the claim and determine the amount of compensation due, if any. It is interesting to note that in the thirty-plus year history of the Liability Convention, a Claims Commission has never been established. A primary reason is that there have been few incidents resulting in damage that could be covered by the Convention.

Thus, with respect to potential collisions in space between space objects, including functioning spacecraft and orbital debris, legal liability for damage will generally be based on "fault" of a launching State or of persons for whom it is responsible. Where orbital debris is involved in a collision, a preliminary question to the "fault" analysis will be whether the debris is identifiable. In the likely event that damage to or destruction of a space object was caused by a small, unobservable fragment, it would be difficult to establish the identity of the launching State and therefore to invoke the Liability Convention.

If both space objects involved in a collision were of known origin, the question would be: what constitutes "fault" in allocating State liability for damage caused by a collision in space? There has never been a claims determination under the Liability

Convention, but we can speculate as to some of the factors that might influence a fault determination. Clearly provisions in the Outer Space Treaty are binding on States Parties and would be considered in assessing a collision. If a collision or damage from a collision was shown to have been proximately caused by actions in violation of a treaty provision, that might be evidence of fault. Some of the Outer Space Treaty provisions that could be relevant are –

- the prohibition on placing in orbit around the Earth any objects carrying nuclear weapons or other weapons of mass destruction, or installing such weapons on celestial bodies or stationing such weapons in space in any other manner (Article IV);
- the requirement that a State which registers a space object retain jurisdiction and control over such object (Article VIII);
- the directive for States Parties to conduct activities in outer space with due regard to the corresponding interests of other States Parties, as well as to avoid harmful contamination of space (Article IX); and
- the requirement to consult internationally before proceeding with activities that would potentially cause harmful interference with other States Parties' activities in space (Article IX).

Provisions in other core space treaties could also be considered. Beyond treaty provisions, a claimant might well seek to invoke technical standards or guidelines that have been adopted by a group of nations. For example, a claimant might argue that non-compliance with such guidelines is evidence of fault; others might argue that compliance with such guidelines is evidence of lack of fault. If such arguments were raised, of

course, any analysis would need to take into account that the guidelines were agreed to in a non-binding context and that treating them as relevant for liability purposes could have a chilling effect on future efforts to negotiate such voluntary guidelines. Regarding space debris, technical guidelines on debris mitigation were recently developed by the Inter-Agency Space Debris Coordination Committee, known as the "IADC". The IADC is an international group of governmental space debris experts. Its members include most space-faring nations, including the United States. In October 2002 it issued its space debris mitigation guidelines to describe and recommend practices for limiting the generation of space debris. These guidelines were adopted by consensus among IADC members. They have been presented to the Scientific and Technical Subcommittee of COPUOS and it is expected that this Subcommittee will endorse the guidelines at its next session in February 2004.

Additionally, any fault analysis for a collision with identifiable debris would likely need to take into account the fact that the present state of space technology does not permit activities in space that are completely debris-free. The question therefore arises whether it would be necessary, in order to establish "fault" for damage caused by debris in space, to demonstrate more than the mere production of debris as a consequence of legitimate space operations. It would appear that other factors such as the proximity of other space objects, the reason for the creation of the debris, and the probability of causing interference with the space activities of other nations would likely be considered when establishing "fault".

The Outer Space Treaty and the Liability Convention provide for State liability for space activities; they do not speak directly to the issue of liability of private

individuals and entities for their activities in space. At the time the treaties were negotiated, virtually all activities in outer space were governmental in nature and the treaties focused predominantly on setting parameters for such space activities. Moreover, international law by its very nature governs relationships between States. Given the increasing commercial activity in space, however, it is quite possible – even likely -- that private actors could be implicated in a collision in space. Legal liability of private operators for their activities in space would generally be a question of national law. Thus, national law would govern both an action by a State that has paid a claim and is seeking contribution or indemnification from the private entity, as well as an action by another private entity for damage resulting from a collision between two privately owned space objects. I would like to touch briefly on the provisions of U.S. law and regulation that are relevant to such liability questions.

There are two kinds of domestic law that are potentially applicable to collisions in space – regulatory law concerning standards that must be met before launch and tort law relating to damage that occurs as a result of operations. In the absence of cases where U.S. regulatory and tort law have been applied to determine liability for collisions in space, it is difficult to predict how a court would approach such a matter. However, it does seem likely that there would be domestic legal ramifications for private operators should their activities in space cause damage to other space objects or to persons or equipment on those objects. Particularly with respect to orbital debris, there is a growing body of regulatory law in the United States that imposes standards on commercial space operations and requires certain representations as to technical plans prior to launch.

The Federal Aviation Administration licenses non-federal launches, including commercial satellite launches in the United States and by U.S. nationals outside the United States. In April 1999 it amended its regulations to include debris mitigation criteria in its licensing process. An applicant must demonstrate that for all launch vehicle stages or components that reach Earth orbit, "debris generation will not result from the conversion of energy sources into energy that fragments the vehicle or its components." Additionally, an applicant must show that the upper stages of a launch vehicle will be vented, or an equivalent practice employed, in order to eliminate explosion potential. (14 CFR 415.39) For reusable launch vehicles, a similar requirement is imposed. (14 CFR 431.43) The FAA also requires that private operators obtain insurance prior to launch to cover potential damage resulting from the launch. However, there is no requirement – by the FAA or other U.S. Government agency – that private operators obtain insurance to cover satellite operations in space.

The National Oceanic and Atmospheric Administration (NOAA) of the Department of Commerce licenses private remote sensing space systems under the Land Remote Sensing Policy Act of 1992. Its licensing authority extends to persons subject to the jurisdiction or control of the United States who operate or propose to operate a private remote sensing space system. One of NOAA's licensing requirements is that licensees "upon termination of operations under the license, make disposition of any satellites in space in a manner satisfactory to the President" in accordance with the Land Remote Sensing Policy Act. NOAA interprets this requirement to mean that a licensee shall assess and minimize the amount of orbital debris released during the post-mission disposal of its satellite. Thus, applicants must present a plan for post-mission disposition

of remote sensing satellites at the time of application for a NOAA license. Possible methods of post-mission disposal are atmospheric re-entry, maneuvering to a storage orbit, or direct retrieval. If atmospheric re-entry is proposed, applicants are required to submit a casualty risk assessment. (15 CFR 960.11)

Commercial telecommunications satellites require licensing by the Federal Communications Commission, which has also been considering orbital debris mitigation measures in its licensing procedures. In March of last year, the FCC issued a notice of proposed rule-making on mitigation of orbital debris. The proposed rule would require satellite system operators seeking an FCC license to disclose during the licensing proceeding orbital debris mitigation plans for all types of satellite systems licensed by the Commission. This would include satellite system operators seeking an FCC authorization for experimental radio service or amateur radio service. Specifically, the proposed rule requires applicants to submit "a description of the design and operational strategies that will be used to mitigate orbital debris, including a casualty risk assessment if planned post-mission disposal involves atmospheric re-entry of the spacecraft." It further mandates that the applicant demonstrate that debris generation will not result from the conversion of energy sources on board the spacecraft into energy that fragments the spacecraft. While the FCC has not yet issued a final rule on mitigation of orbital debris, it has indicated that it is proceeding on a case-by-case basis in the interim to consider debris mitigation measures in its licensing. A final rule will probably be adopted in the next six months.

These regulatory developments clearly have a bearing on the consequences of collisions in space for U.S. licensed operators. First, the regulations are expected to

reduce the generation of orbital debris as spacecraft will be designed with debris mitigation in mind; thus, they should ultimately reduce the likelihood of collisions between functioning spacecraft and debris. Further, from the legal point of view, they set a national standard for and require certain undertakings by persons proposing satellite launches and operations. While we cannot predict how they would come into play if a collision involving orbital debris were to occur, they should clearly be taken seriously by persons engaging in space activities.

As an aside, I would also like to note that in the debris mitigation area, the U.S. Government adopted standard practices for limiting debris in December 2000. These U.S. Government Orbital Debris Mitigation Standard Practices are implemented by each government agency according to its own set of policies and procedures. NASA and the Department of Defense, which are responsible for the majority of government satellites, have issued very specific policies, directives, instructions and guidelines to curtail the creation of orbital debris.

I mentioned previously that domestic tort law could also be applicable in case of damage caused by collisions in space where U.S. persons were involved. There have not been any tort cases in the United States resulting from collisions in space; however, should incidents occur, U.S. courts could begin to address the issues and develop case law. A suit against the United States, as opposed to a private entity, would have to be in accordance with the Federal Tort Claims Act. For claims against private entities, U.S. courts might establish jurisdiction where negligence or a wrongful act in the United States resulted in damage caused by debris in space or elsewhere outside the United States. Thus, even aside from federal regulation, the development of a body of common

law related to damage caused by collisions in space could lead to the existence of standards regarding expected practices, including debris minimization, in space operations.

To conclude, I would simply emphasize that, fortunately, there have been very few incidents where damage resulted from the operation of space objects. Accordingly, there have not been Claims Commission decisions interpreting the Liability Convention or judicial decisions regarding liability for collisions in space. It is my fervent hope that these questions and answers will continue to be hypothetical; certainly your continued efforts in enhancing the safety of satellite operations are key to this. Nonetheless, the increasing activity in space, and particularly in certain heavily trafficked orbits, suggests that there may be incidents through which these questions will need to be concretely addressed.

Thank you for your attention.